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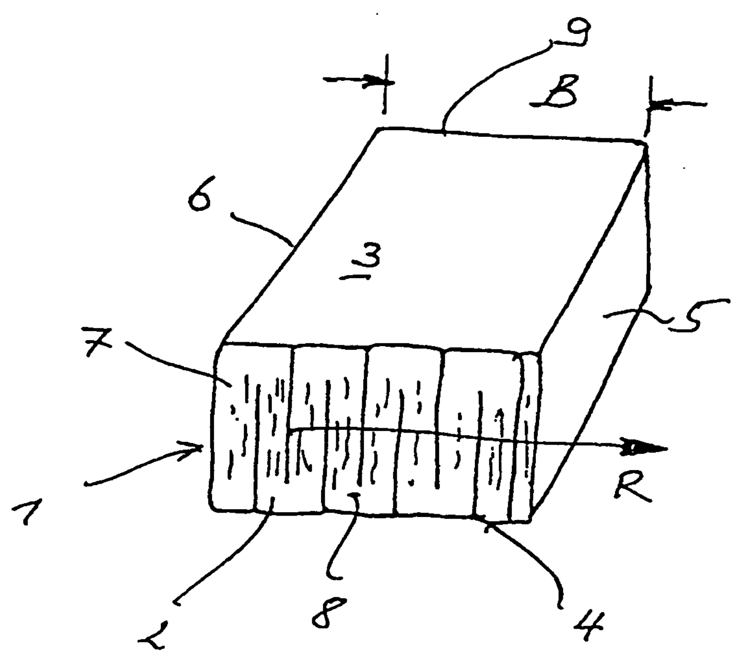
(54) Title: MINERAL-WOOL INSULATION BOARD FOR INSULATION BETWEEN ROOF-RAFTERS, WOODEN-FRAME STRUCTURES AND PROCESS FOR ITS MANUFACTURING

(57) Abstract

An insulation board made of mineral wool to provide insulation between roof rafters and wooden-frame structures has at least one elastically compressible area created by curved folds of a mineral-wood fleece, so that the insulation board is compressed and, in this compressed condition, installed between the rafters or beams of a structure and as the result of elastic recovery forces wedged in place there.



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MINERAL–WOOL INSULATION BOARD FOR INSULATION BETWEEN ROOF–RAFTERS, WOODEN–FRAME STRUCTURES AND PROCESS FOR ITS MANUFACTURING

The invention relates to an insulation board as described in the Preamble to claim 1 and processes to manufacture such an insulation board.

The invention relates mainly to the field of roof insulation, in particular, the insulation of pitched roofs, and also the insulation of wooden-frame structures. The insulation of pitched roofs, especially, is an extremely important source of revenues within the field of insulation technology. In this context, the following problem arises: the distances between the rafters of a roof or the beams of a wooden-frame structure between which the insulation board is installed vary from one construction site to the other and sometimes even on one and the same construction site. For this reason,

insulation boards of various graded widths are available on the market, so that insulation boards with the appropriate width can be used to suit the specific situation, i.e. the given distance between the rafters. However, the distances between rafters or beams on a construction site are never exactly identical but may even vary considerably. This presents a major problem, in particular where old buildings are concerned and a solution must be found to avoid heat-loss paths and to achieve satisfactory positioning of the insulation boards between the rafters or beams.

A number of solutions that eliminate these difficulties are known. DE-OS 32 03 622, in particular, provides for the milling of the peripheral sections of the insulation boards sold in predefined graded widths. Milling is effected with special milling mills acting upon certain areas of the insulation board. As a result of this milling process carried out by means of several milling mills or rollers, the fiber structure of the insulation board is destroyed in certain areas, thus reducing the strength of the insulation board there and rendering it compressible. An insulation board milled in this way can thus be compressed accordingly and inserted between the individual rafters of a rafter structure. As a result of the elastic recovery forces created through such compression, the insulation board can then be wedged between the rafters without any additional fastening measures. The compressibility of the insulation board allows one and the same insulation board to cover a given distance between the rafters or beams. The insulation board can thus be used for a certain range of varying rafter distances. In this solution, however, the fiber structure is destroyed in certain areas. Due to particle loss, this results in a gradual loss of material which is detrimental to insulating efficiency. Moreover, the disintegration of the material

structure results in a restriction of elastic recovery forces which is difficult to define. Above all, however, production of the insulation board requires an additional manufacturing step because of the milling station, thus rendering the manufacturing of such an insulation board more expensive. As such insulation boards are mass-produced, this factor is of considerable importance.

It is therefore the object of this invention to design an insulation board to be installed between the rafters or beams of a rafter or wooden-frame structure which, with a predefined width, can be used for varying rafter or beam distances, easily installed, and lodged between the rafters or beams merely by its own self-wedging forces without any additional fastening elements. In addition, the insulation board should be simple to manufacture and ensure correct and uniform insulation across the entire board.

This object is established with an insulation board as characterized in claim 1 with the process-engineering aspects of the object being established as characterized in claim 7. A suitable device is characterized in claim 12 with suitable further developments being characterized in the subclaims.

As provided for by the invention, an insulation board is made available which, at least in certain areas, consists of mineral-wool-fleece folds arranged fold by fold, thus creating a compressible area of the insulation board and making it possible to vary the width of the board in order to wedge it between the rafters or beams of a rafter or wooden-frame structure. The folds of the insulation board are created by meandrous folding of the mineral-wool fleece vertical to the insulation board's two

main surfaces. In the preferred embodiment of the invention, the entire insulation board consists of one layer of mineral-wool fleece, in particular, rock wool, in curved folds. Such an insulation board can be compressed easily as required and, in particular, without damaging the fiber structure. This promotes insulating efficiency and, in particular, ensures reproducible conditions for all insulation boards, which is important in mass production to achieve constant quality.

To achieve the required compressibility of the insulation board, a gross weight of ≤ 60 kg/m^3 , more specifically ≤ 45 m^3, has proved advantageous. The raw unit weight of these boards is preferably between 15 and 35 kg/m^3. A raw unit weight of 30 kg/m^3 $\pm$ 3 kg/m^3 has proved particularly suitable. With these raw unit weight values, the desired board compressibility and the development of elastic recovery forces are achieved which ensure that the insulation board remains securely wedged between the rafters or beams of a rafter or wooden-frame structure without additional fastening elements. Another advantageous parameter to determine the desired product characteristics is the G.S.M (grams per square meter) or weight by surface of the layer which emerges from the fall shaft. The G.S.M. is between 2 and 3 kg/m^2, preferably between 2.3 and 2.6 kg/m^2. The portion of bonding agent preferably amounts to between 1 and 3%, more specifically around 2%, thus ensuring that the insulation board may be classified as "non-flammable". The folding of the insulation board is achieved without excessive compressive pressure, with the pressure required to compress the board being basically merely sufficient to result in the free folding of the fleece layer.

According to a particularly preferred process for manufacturing the insulation board, the mineral-wool layer emerging from the fall shaft is transported by a pair of conveyor belts to a second pair of conveyor belts which is operated at a lower velocity than the first pair of conveyor belts. This results in a bulging of the fleece between the conveyor-belt pairs and thus in folding. Preferably, the folding process or bulging of the mineral-wool fleece runs unhindered, at least initially, so that free folding, which is decisive for the desired compressibility of the final product, takes place, at least during the initial phase. Such free bulging is achieved simply by positioning the appropriate conveyor belts of the two pairs of conveyor belts at a certain distance to each other.

It has also proved advantageous if the upper belt of the first pair of conveyor belts runs faster than the upper belt of the second pair of conveyor belts and, especially, if the lower belt of the first pair of conveyor belts runs faster than the upper conveyor belt of the first pair of conveyor belts. It is advisable to operate the two belts of the second pair of conveyor belts at the same velocity. This velocity ratio has a favorable effect on the desired folding performance.

Embodiments of the invention are described below by reference to the enclosed drawings. The figures show the following:

Fig. 1 shows a preferred embodiment of the insulation board of the invention,

Fig. 2, 3 and 4 show a schematic presentation of the manufacturing process, and

Fig. 5 shows a compressed insulation board as installed between the rafters of a roof or the beams of a wooden-frame structure.

The insulation board illustrated in Figure 1 consists of a layer, 2, of a mineral-wool fleece. The two main surfaces of the insulation board are designated 3 and 4. In the insulation board's position of installation between the rafters of a roof or the beams of a wooden-frame structure, one of these main surfaces points to the roof or wall surface and the other towards the interior of the room. When installed, the insulation board's lateral faces, 5 and 6, sit close to the structure's rafters or beams. The mineral-wool-fleece layer, 2, which in the preferred embodiment is made of rock wool, consists of meandrous folds with the folds being arranged directly and very closely to each other. The folds are designated 7. Folding takes place vertically to the two main surfaces, 3 and 4, so that the folds, and thus fiber alignment in general, also run vertical to these main surfaces, 3 and 4. In the illustrated embodiment, each fold extends across the entire thickness of the insulation board, i.e. the length of each fold, 7, corresponds to the thickness of the insulation board, 1. It is also possible, however, to split the insulation board, 1, folded in such a way approximately at the middle and parallel to its main faces, so that two boards with a thickness of half the original fold length are obtained. It is thus possible, for example, to fold 200 mm thick boards and, by splitting them in two, to obtain two boards with a thickness of 100 mm each with the compressibility effect being maintained.

The raw unit weight of insulation board 1, which according to Figure 1 consists only of one mineral-wool-fleece layer, 2, is ≤ 60 kg/m^3, preferably ≤ 45 kg/m^3. In this context, a particularly preferred range of the raw unit weight of insulation board 1 lies

between 15 kg/m^3 and 35 kg/m^3. A raw unit weight of 30 kg/m^3 ± 3 kg/m^3 has proved especially feasible for the intended application, i.e. insulation between rafters of a roof or wooden-frame structures. The share of the bonding agent in the mineral-wool fleece ranges from 1 to 3% and, preferably, amounts to approx. 2%. This ensures that an insulation board with this composition is classified as "non-flammable", i.e. falls under class A1 as per DIN 4102. A mineral-wool fleece folded in such an easy, free way with almost no compressive pressure forms an insulation board that can be elastically compressed in direction R, i.e. parallel to the two main surfaces 3 and 4. Compression of the board results in the development of elastic recovery forces, so that the insulation board, after having been installed between the rafters or beams of a roof or wooden-frame structure, is securely wedged at its place of installation. Additional auxiliary measures such as fastening the board to a foil strip with the help of a tacker or fastening it to transverse wooden strips nailed to the rafters to hold the insulation board as such are unnecessary. In addition, depending on the individual insulation-board design and dimensioning, distances between rafters varying within a certain range can be bridged with an insulating board of a certain rated width.

Preferably, width B of insulation board 1, which is decisive for bridging the distance between the rafters or beams of a roof or wooden-frame structure, is dimensioned in such a way that the insulation boards are sold in rated widths of between 55 and 100 cm with 5 cm graduations. Of course, other width graduations are also possible. An insulation board with a width B of 60 cm, for example, can be used for rafter distances of approximately 54 to 59 cm without any problems, i.e. may be used for rafter distances in this range while still ensuring perfect lodgement. The installation of such an insulation board is also very simple and can be carried out by an

untrained person holding the insulation board 1 with both hands and compressing it slightly while he/she pushes it between the rafters or beams of the roof or wooden-frame structure. In this context, the parallel layers, 7, actually exert a wedge effect, i.e. it is sufficient to initially insert only a small part of the compressed insulation board. The outer layers, 7, assume a slightly angular position in the manner of a wedge and the inner layers become further compressed. The insulation board can then easily be pushed or tapped into its final position with both hands. This ensures firm and permanent positioning of the insulation board without any heat-loss paths between the rafters or beams.

If required, one or several identification lines, e.g. arrows, can be applied to one or two of the insulation board's main surfaces, 3 and 4, or to the sides, 8 or 9, corresponding to the width of the board in order to illustrate the direction of compression to the on-site user, which is, per se, automatically predefined by the folds, which are also visible from the outside. Especially suitable in this context is identification via hot air applied through hot nozzles.

Production of the insulation board is simple and is as follows: the mineral-wool fleece, which is produced within a fall shaft and emerges therefrom, is guided between a first pair of conveyor belts consisting of two endless belts, 10 and 11, positioned at a certain distance from each other. The fleece is then conveyed to a second pair of conveyor belts consisting of belts 12 and 13 which are also positioned at a certain distance from each other. The second pair of conveyor belts, 12 and 13, is operated at a lower velocity than the first pair of conveyor belts, 10 and 11 (see also Figures 2 and 3). The layer of mineral-wool fleece is thus transported

more slowly in the area of the second conveyor unit, so that the fleece layer which arrives at a higher velocity via the first conveyor unit bulges and folds. Here, it is advisable if the distance between the upper conveyor belts, 10 and 12, is larger than the distance between the lower conveyor belts, 11 and 13, so that the fleece layers can still bulge freely at the top, 14. This supports the free folding of the fleece layer with very little compressive pressure being required to achieve the compression performance required in the final product. Of course, the conveyor belts of the first conveying unit can also be uniformly operated faster than the second pair of conveyor belts, 12 and 13. With a view to the aspired free bulging or folding of the fleece layer between the pairs of conveyor belts, however, it is particularly suitable, if velocity v 1 of the first upper conveyor belt 10 is higher than velocity v 3 of the second upper conveyor belt 12 and velocity v 2 of the first lower conveyor belt higher than velocity v 1 of the first upper conveyor belt 10. The folding behavior can be varied by adjusting the velocities accordingly and the compression behavior thus adjusted through selection of suitable velocity values taking into account the raw unit weight and the required degree of compression.

In the embodiment shown in Figure 3, free bulging is further promoted if the first upper conveyor belt, 10, is arranged at an angle to the lower conveyor belt, 11. In this case, too, targeted changes relating to folding and thus adjustments relating to the compression behavior of the insulation board can be achieved by adjusting the angle.

The second pair of conveyor belts, 12 and 13, transports the insulation board to a tunnel furnace where the bonding agent is thermally cured and the folding status thus retained.

In an alternative manufacturing process, it is also possible to lead the fleece emerging from the fall shaft in the direction of the gap between two vertically arranged conveyor belts with the fall shaft or pair of conveyor belts being subjected to reciprocal transversal movements leading to folding of the mineral-wool-fleece layer. In this case, it has proved advisable to position at least one of the conveyor belts of the pair at a slight angle to the other to promote folding.

Figure 4 shows a schematic presentation of the insulation board emerging from the tunnel furnace with line 15 only provided as a purely schematical illustration of the fleece layer in meandering folds. At 16, the separating cut is carried out, producing insulation board 1, with a predefined rated width B, which is then ready for installation.

Figure 5 shows insulation board 1 without compression (broken line) and the compressed insulation board ready for installation between the rafters or beams of a structure (unbroken line).

Claims

1. Insulation board (1) made of mineral wool, specifically rock wool, to act as insulation between roof rafters, wooden-frame structures and the like, which insulation board is designed so as to be elastically compressible parallel to its main surfaces in some parts at least in order to ensure its lodgement between the adjacent rafters or beams of a roof or wooden-frame structure via a wedging effect based on the elastic recovery forces resulting from compression of the board **characterized in that** the elastic compressible area of insulation board (1) consists of at least one folded mineral-wool fleece arranged fold to fold, the fleece being preferably folded vertically to the insulation board's two main surfaces like a meander.

2. Insulation board of claim 1 **characterized in that** the mineral-wool fleece has a weight by surface of 2 to 3 kg/m^2, preferably 2.3 to 2.6 kg/m^2 in the folds.

3. Insulation board of claim 1 or 2 **characterized in that** the bonding-agent content of the mineral-wool fleece is between 1 and 3 %, preferably around 2%.

4. Insulation board according to one of the preceding claims **characterized in that** the raw unit weight of the insulation board (1) is $\leq$ 60 kg/m^3, preferably, $\leq$ 45 kg/m^3 and especially preferred in the range of 15 to 35 kg/m^3.

5. Insulation board according to one of the preceding claims **characterized in that** the insulation board (1) consists throughout its entire width (B) of a mineral-wool fleece in meandering folds.

6. Insulation board according to one of the preceding claims **characterized in that** the length of the folded layer corresponds to the insulation board thickness (1).

7. Insulation board according to one of the preceding claims **characterized in that** the thickness of the insulation board (1) corresponds to approximately half the fold length obtained by cutting the insulation board of claim 6 in halves.

8. Process to manufacture an insulation board according to one of the preceding claims **characterized in that** a mineral-wool fleece emerging from a fall shaft or the like is inserted in a meandering manner between conveyor belts or a mineral-wool fleece which at first is inserted between the conveyor belts (10, 11) without any folds, is folded in a meandrous way between two pairs of conveyor belts (10, 11; 12, 13) running at different velocities. After folding, the insulation board is fed into a curing furnace.

9. Process of claim 8 **characterized in that** the mineral-wool fleece has a weight by surface of 2 to 3 kg/m^2, preferably 2.3 to 2.6 kg/m^2 which promotes folding.

10. Process of claim 8 or 9 **characterized in that** folding between the pair of conveyor belts is effected by free bulging of the mineral-wool fleece.

11. Process of claims 8 to 10 **characterized in that** the insulation board is created by folding a mineral-wool fleece with a fold length corresponding to the required insulation-board thickness.

12. Device to manufacture an insulation board of claims 1 to 6 **characterized in that** two pairs of conveyor belts (10, 11; 12, 13) are operated in sequence with the upper conveyor belt of the first and the second pair of belts preferably being positioned at a greater distance from each other than the lower conveyor belts (11, 13) or vice versa.

13 Device of claim 12 **characterized in that** one of the conveyor belts of the first pair of conveyor belts (10, 11) is arranged at an angle to the direction of conveyance thus leading to a narrowing of the conveying gap in the direction of conveyance.

Fig. 1

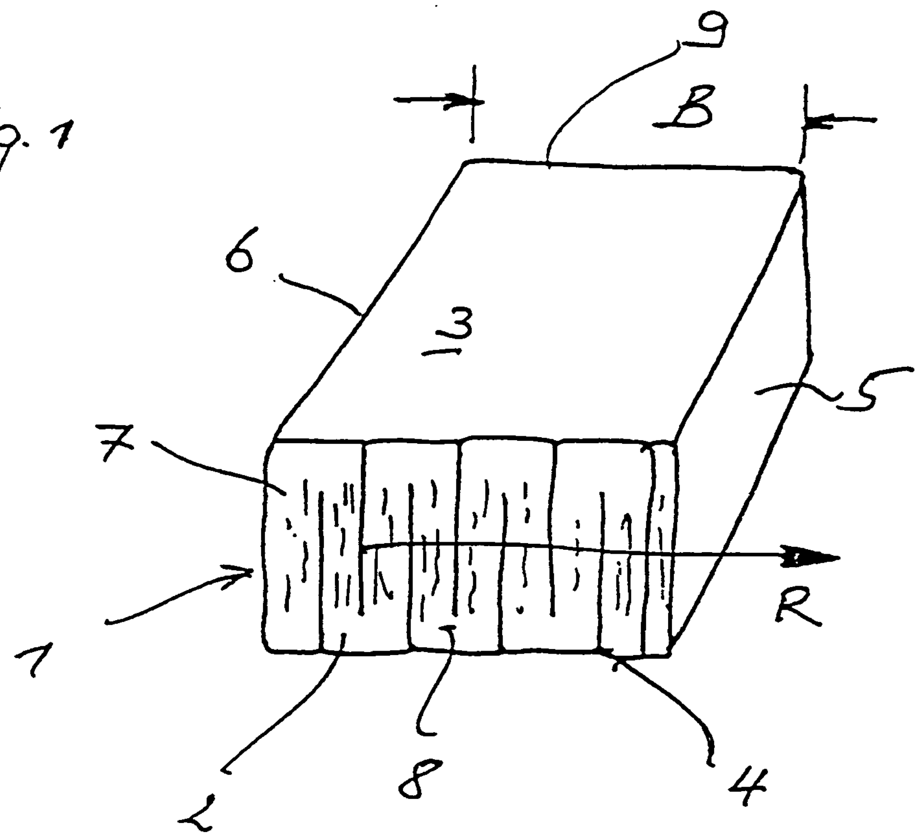


Fig. 2

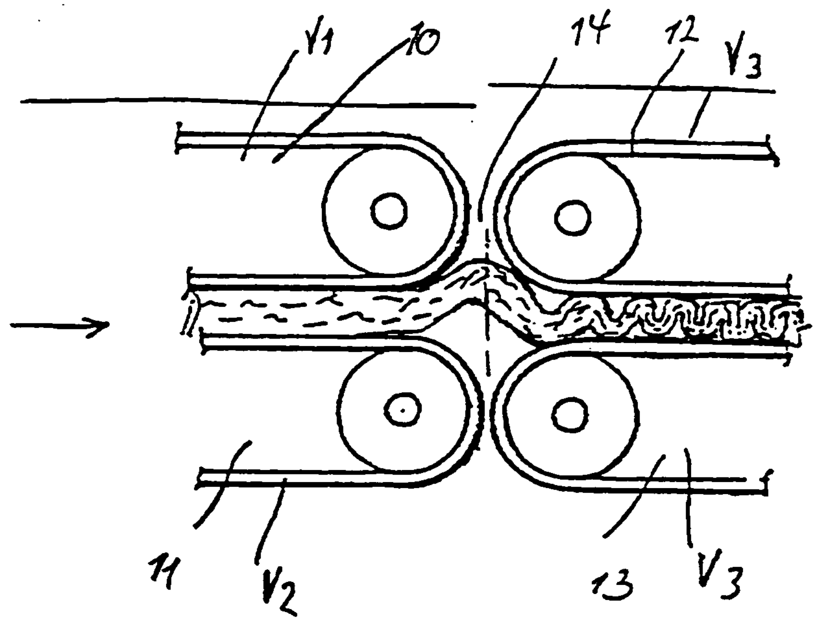
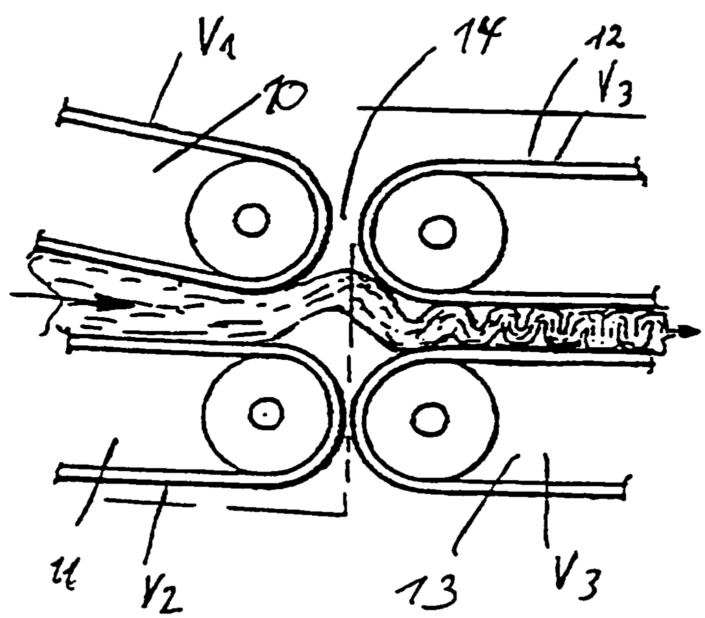


Fig. 3



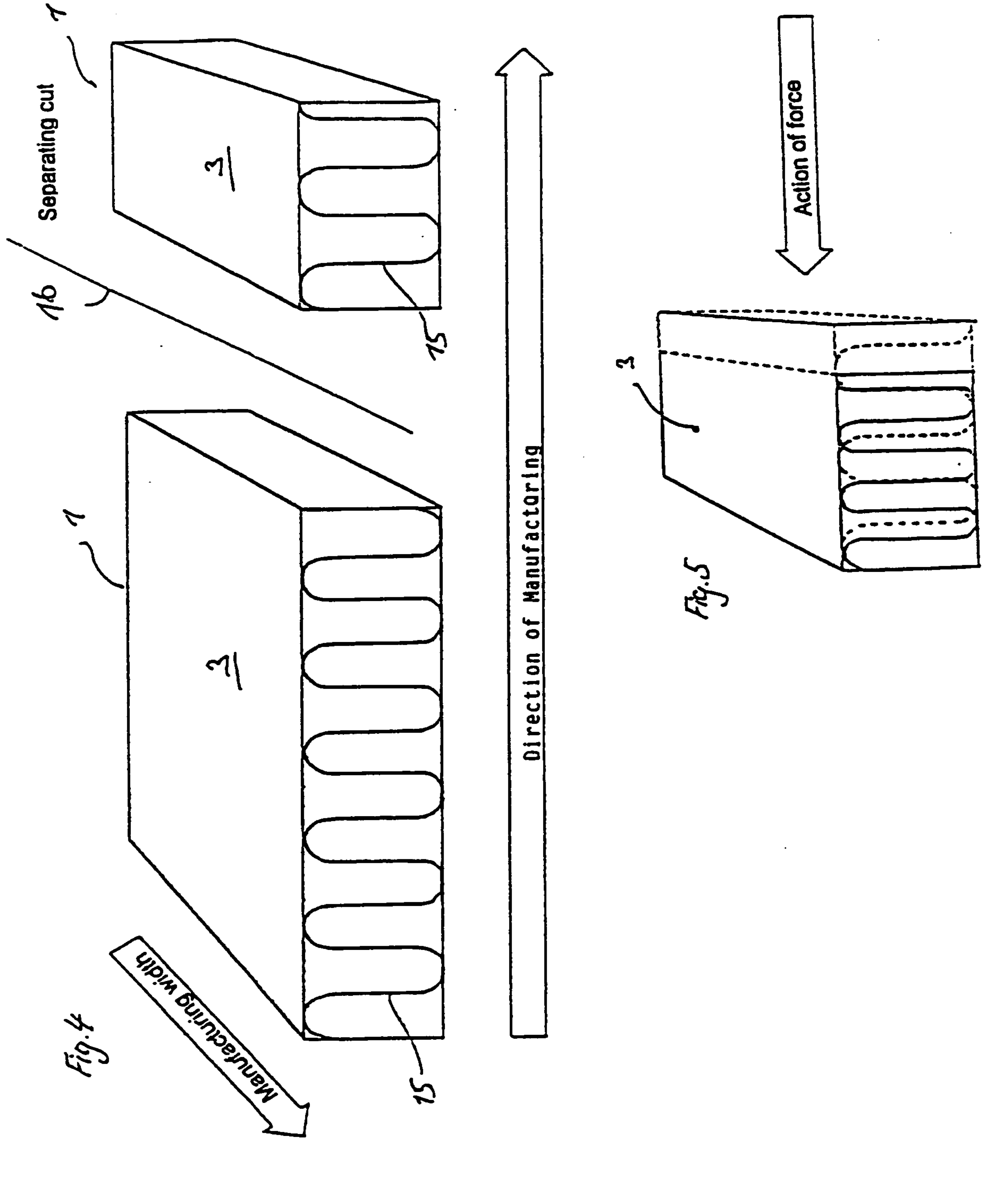

Separating cut
Direction of Manufactoring
Action of force
Manufacturing width
1
3
15
16

Fig.4

Fig.5

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 99/06964

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E04B1/76 E04B1/78 D04H1/70

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E04B D04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 409 951 A (J. NOOTENS) 22 October 1946 (1946-10-22) column 5, line 1 -column 8, line 33; figures 1-3	1,5
Y		2,4,8, 10-12

X	DE 30 32 867 A (KURTZ FA PH) 15 April 1982 (1982-04-15) page 5, paragraph 4 -page 6; figure 1	1,6

Y	WO 98 28501 A (BUGERT KARL HANS ;SCHLOEGL JOACHIM (DE); SAINT GOBAIN ISOVER (FR)) 2 July 1998 (1998-07-02) page 6, paragraph 1 page 10, paragraph 3 -page 11	2,4
A		9

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 99/06964

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	WO 97 01006 A (CRIDLAND IAN ;ROCKWOOL INT (DK)) 9 January 1997 (1997-01-09) page 34, line 33 -page 35, line 21; figure 14	8,10-12
Y	WO 94 16162 A (ROCKWOOL INT ;BRANDT KIM (DK); HOLTZE ERIK (DK)) 21 July 1994 (1994-07-21) page 14, line 22 - line 33 page 20, line 22 -page 21, line 5; figures 1,3A-B	8,10,11
A		13
A	EP 0 691 439 A (ISOBOUW DAEMMTECHNIK GMBH) 10 January 1996 (1996-01-10)	

1

INTERNATIONAL SEARCH REPORT

...ormation on patent family members

Intern ıal Application No
PCT/EP 99/06964

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2409951 A	22-10-1946	NONE	
DE 3032867 A	15-04-1982	NONE	
WO 9828501 A	02-07-1998	AU 5762998 A	17-07-1998
		CA 2246716 A	02-07-1998
		CZ 9803004 A	14-04-1999
		EP 0886704 A	30-12-1998
		NO 983870 A	21-08-1998
		PL 328825 A	15-02-1999
WO 9701006 A	09-01-1997	AU 6188396 A	22-01-1997
		BG 102119 A	30-11-1998
		CA 2225051 A	09-01-1997
		CZ 9704048 A	15-04-1998
		DE 29680532 U	13-08-1998
		EP 0833992 A	08-04-1998
		HU 9802815 A	29-03-1999
		PL 324173 A	11-05-1998
		SK 165697 A	06-05-1998
WO 9416162 A	21-07-1994	AU 5857994 A	15-08-1994
		BG 99830 A	29-03-1996
		CZ 9501796 A	17-04-1996
		EP 0688384 A	27-12-1995
		HU 74289 A	28-11-1996
		NO 952694 A	14-07-1995
		PL 309895 A	13-11-1995
		RO 112902 A	30-01-1998
		SK 89695 A	06-12-1995
EP 0691439 A	10-01-1996	DE 4423747 A	11-01-1996
		PL 309523 A	08-01-1996